

Patent Claims:

1. Method of manufacturing metallised substrate materials which are suitable for the manufacture of electrical circuit carriers which may be used in the gigahertz range, in which substrates having fluoropolymer surfaces are securely coated with metal layers by

- a. a first metal layer containing nickel being deposited on the fluoropolymer surfaces by the decomposition of volatile nickel compounds by means of a glow discharge process and
- b. a second metal layer being deposited on the first metal layer from a metallisation bath.

2. Method according to claim 1, characterised in that the first metal layer is subsequently treated in the following process steps:

- a1. treatment of the metal layer in an atmosphere containing oxygen by means of a glow discharge process,
- a2. treatment of the metal layer in an atmosphere containing hydrogen by means of a glow discharge process.

3. Method according to one of the preceding claims, characterised in that the second metal layer is deposited by means of an electroless method.

4. Method according to claim 3, characterised in that a nickel layer or an alloy layer composed of nickel with boron or phosphorous is deposited as the second metal layer.

5. Method according to one of the preceding claims, ^{and 2} characterised in that organic nickel compounds are used as the volatile nickel compounds.

6. Method according to one of the preceding claims, ^{and 2} characterised in that the fluoropolymer surfaces are pre-treated before the formation of the first metal layer with a glow discharge process in the presence of an etching gas in such a manner that the surfaces are very smooth.

7. Method according to claim 6, characterised in that the average peak-to-valley height R_a of the fluoropolymer surfaces after carrying out the pre-treatment with the glow discharge process is at the most 100 nm, preferably at the most 20 μm , averaged over 1 μm^2 .

8. Method according to ^{claim 6} ~~one of claims 6 and 7~~, characterised in that the etching gas, during its action on the surfaces, is adjusted to a pressure of at least 20 Pa, preferably at least 50 Pa.

9. Method according to ^{claim 6} ~~one of claims 6 to 8~~, characterised in that the fluoropolymer surfaces are pre-treated in the presence of an oxygen/tetrafluoromethane gas mixture as the etching gas.

10. Application of the method according to one of the preceding claims ^{1 and 2} ~~for~~ forming conductor structures on the fluoropolymer surfaces by structuring of the obtained metal layers with suitable etch resists and subsequent etching away of the metal layer regions not forming the conductor structures, or by structuring of the fluoropolymer surfaces with suitable resists and subsequent deposition of metal layers in the regions of the fluoropolymer surfaces forming the conductor structures.

11. Application of the method according to one of claims 1 to ² ~~7~~ for forming a mask for plasma etching on the fluoropolymer surfaces by structuring of the obtained metal surfaces with suitable etch resists and subsequent etching away of the metal layer regions not forming the mask, or by structuring of the fluoropolymer surfaces with suitable resists and subsequent deposition of metal layers in the regions of the fluoropolymer surfaces forming the mask.